

DER Market Integration Consultative Forum



28 April 2022



We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

We pay respect to their Elders past, present and emerging.

AEMO Competition Law Meeting Protocol

AEMO is committed to complying with all applicable laws, including the Competition and Consumer Act 2010 (CCA). In any dealings with AEMO regarding proposed reforms or other initiatives, all participants agree to adhere to the CCA at all times and to comply with this Protocol. Participants must arrange for their representatives to be briefed on competition law risks and obligations.

Participants in AEMO discussions **must**:

- Ensure that discussions are limited to the matters contemplated by the agenda for the discussion
- Make independent and unilateral decisions about their commercial positions and approach in relation to the matters under discussion with AEMO
- Immediately and clearly raise an objection with AEMO or the Chair of the meeting if a matter is discussed that the participant is concerned may give rise to competition law risks or a breach of this Protocol

Participants in AEMO meetings **must not** discuss or agree on the following topics:

- Which customers they will supply or market to
- The price or other terms at which Participants will supply
- Bids or tenders, including the nature of a bid that a Participant intends to make or whether the Participant will participate in the bid
- Which suppliers Participants will acquire from (or the price or other terms on which they acquire goods or services)
- Refusing to supply a person or company access to any products, services or inputs they require

Under no circumstances must Participants share Competitively Sensitive Information. Competitively Sensitive Information means confidential information relating to a Participant which if disclosed to a competitor could affect its current or future commercial strategies, such as pricing information, customer terms and conditions, supply terms and conditions, sales, marketing or procurement strategies, product development, margins, costs, capacity or production planning.

Today's meeting

Time	Item	Speaker
11:00 – 11:05	Welcome and introductions	Rachel Rodrigues McGown [AEMO]
11:05 -11:15	Project EDGE Update Public Interim Report Overview	Nick Regan [AEMO]
11:15 - 11:45	Project EDGE – CBA Methodology	Jonathon Curry [Deloitte AE] Dr Alina Dini [Deloitte AE]
11:45 – 12:05	Schedule Lite Update	Trent Morrow [AEMO]
12:05 – 12:25	Q&A	All
12:25 – 12:30	Future Meetings & Close	Rachel Rodrigues McGown [AEMO]

Project EDGE Update & Public Interim Report Overview



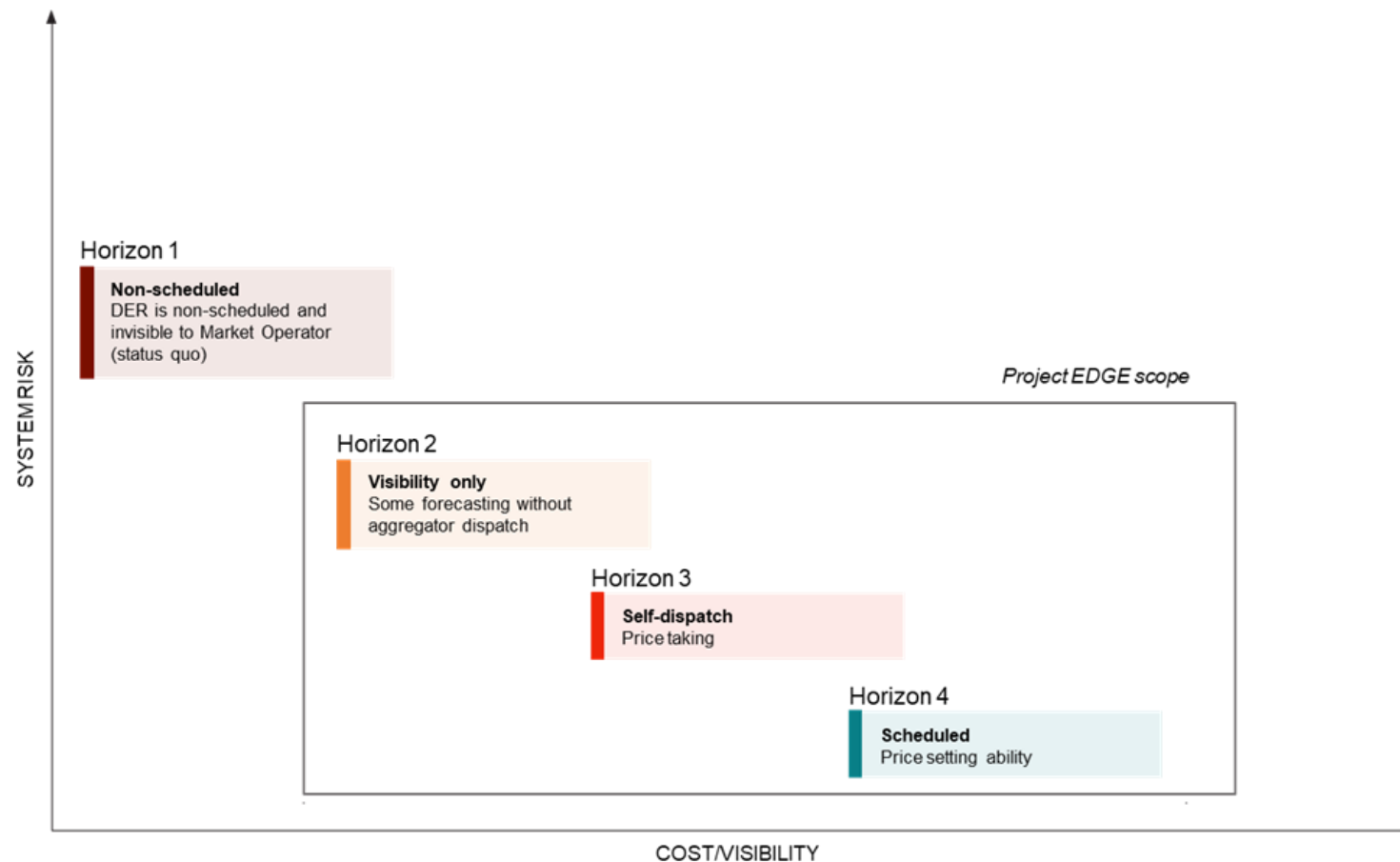
Nick Regan [AEMO]



Wholesale integration insights

The project will test a progression of options for obtaining visibility and dispatch of DER fleets

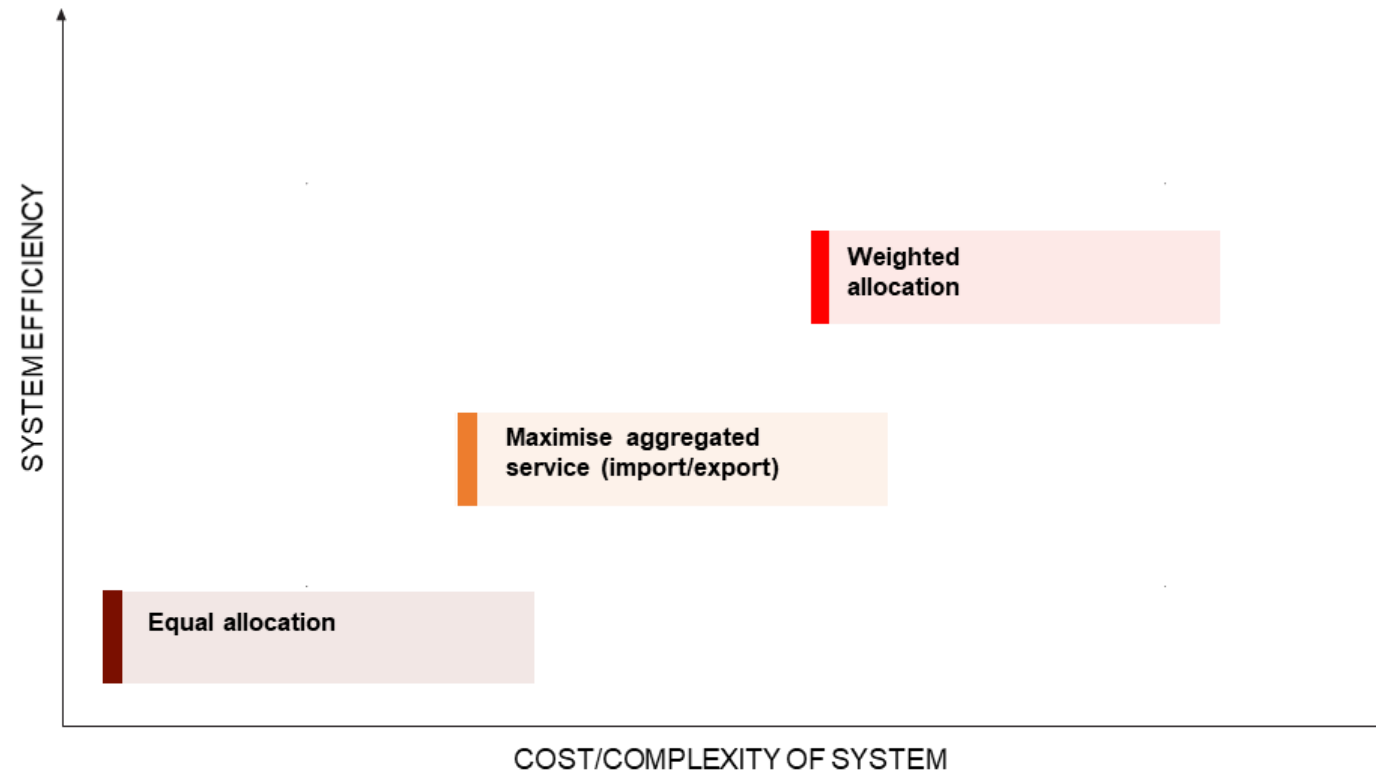
Project EDGE is exploring a spectrum of approaches that span a simplicity-efficiency trade-off continuum, from relatively simple and lower cost to implement, but relatively inefficient, to more complex, higher cost to implement and more efficient.



- **Reforms:** The ESB has recommended a mechanism (Scheduled Lite) to encourage opt-in scheduling of aggregated DER.
- **Objective:** EDGE aims to understand how to optimally integrate DER while maintaining power system operability.
- **Evidence base:** EDGE can inform the design and implementation of Scheduled Lite.

Three objective functions for DOE implementation were considered by the project

The DOE implementation process includes the development of the objective function of the calculation. EDGE is testing three objective functions.



* System efficiency = network and market efficiency

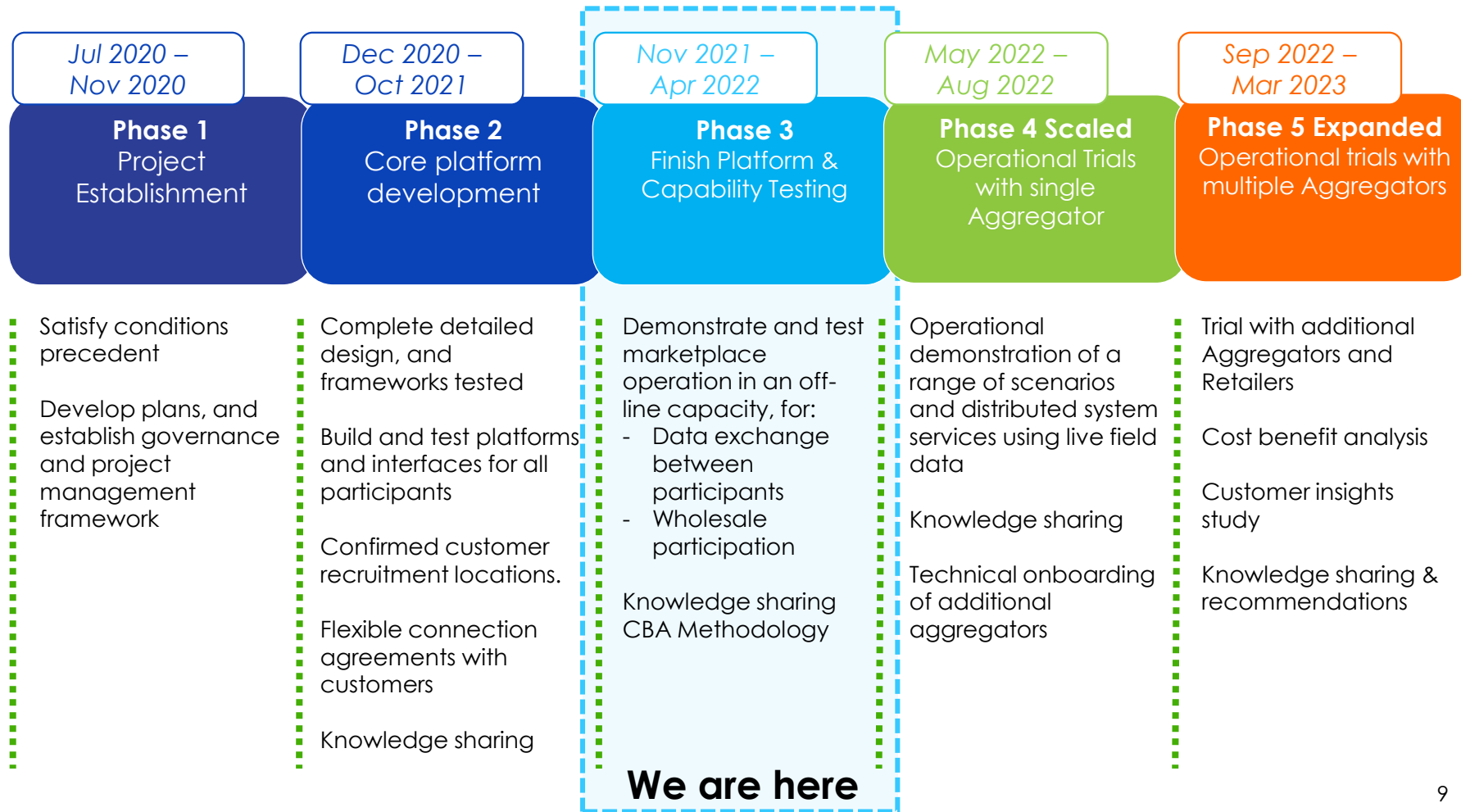
- **Equal allocation:** Initial modelling indicates 'Equal allocation' results in material underutilisation of the network compared to 'Maximise aggregated service'.
- This means DER resources may be constrained unnecessarily.
- **Maximise aggregated services:** Avoiding voltage problems may result in unequal DOEs
- **Weighted allocation** has potential to enable maximum DER participation opportunity (increase efficiency).
- However, it is more complex and costly.
- The cost may not be worth the benefit, particularly at scale.

Next steps for the project



Project EDGE | Schedule

Based in Hume region of Victoria
 Five Phases, from July 2020 – March 2023



Project EDGE – CBA Methodology

Jonathon Curry [Deloitte AE]
Dr Alina Dini [Deloitte AE]

Purpose of the Project EDGE Cost-benefit Analysis (CBA)

The Project EDGE CBA's purpose

Project EDGE establishes a DER Marketplace where customer DER would be used by DER aggregators to provide DER services in exchange for customer and aggregator benefits.

The purpose of the CBA is to identify and analyse whether the implementation of an operational distributed energy resources (DER) Marketplace (after the proof-of-concept version is tested in the Project) is in the long-term interests of electricity consumers.

The CBA also assesses the conditions under which a DER Marketplace would be in the long-term interests of consumers (for example, through its expected impacts on DER operation, penetration and customer demand) in line with the national electricity objective (NEO).

If so, the CBA will also assess under which scenarios adding more complexity and sophistication to the DER Marketplace may be justified.

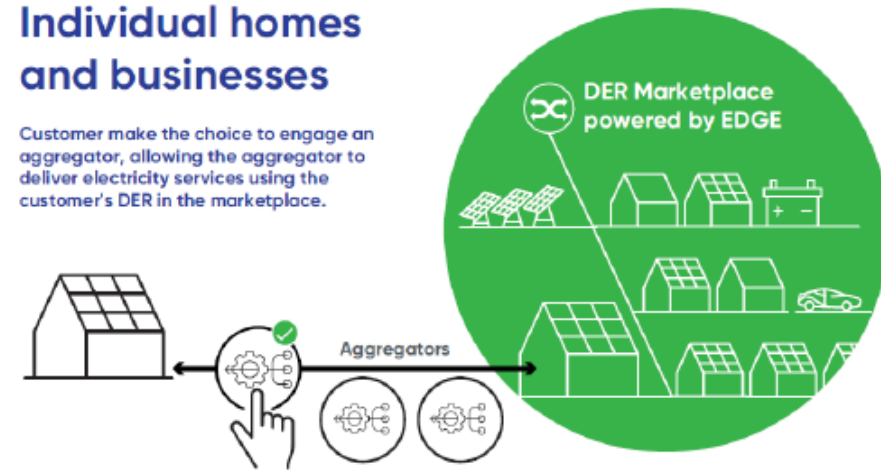
An example of this is assessing how distribution network limits should be considered in wholesale dispatch and how DER participation in central dispatch should be progressively achieved.

How EDGE's DER marketplace would operate from an electricity customer's perspective



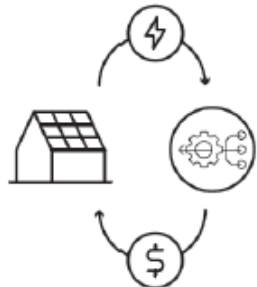
Individual homes and businesses

Customer make the choice to engage an aggregator, allowing the aggregator to deliver electricity services using the customer's DER in the marketplace.



The customer is in control of how their DER is used by choosing which aggregator to engage.

Aggregators will only use DER in the way agreed to by the customers.



The aggregator will provide value to the customer based on how their DER is used in the marketplace.

Project Edge's CBA scope and methodology

CBA Scope

The Cost Benefit Analysis (CBA) seeks to determine if an operational DER marketplace is in the long term interests of consumers in the NEM, including any conditions which may maximise this value.

Scenario analysis is used to test the value of the Project EDGE Marketplace within future market environments with varying key parameters (such as economic growth, DER uptake and demand).

The CBA aligns with the AER's CBA guidelines for investment justification and the AEMC's interpretation of the National Electricity Objective (NEO).

It will be able to be used as an evidence base to inform regulatory decision making, such as:

- Implementation of the ESB post 2025 recommendations
- AEMC rule changes associated with implementation of DER Marketplace capabilities
- AER revenue determinations with regards to DNSP proposals to develop DSO capabilities.

The Project Research Plan developed by The University of Melbourne has outlined priority research questions and associated hypotheses of the Project.

CBA Methodology

The CBA for Project EDGE is being developed as per the following:

1. Defining a development path to be tested. Under the scope of this project, this involves the establishment and operationalisation of a DER Marketplace
2. Define a counterfactual development path which will be used as a base case (Scenario 1) to be compared against the development path.
3. Identify and quantify the present value of costs that will be borne in order to establish and operate a DER Marketplace, making sure to only include costs that would have not occurred under the defined base case, which include and are not limited to:
 - project development costs
 - operating and maintenance costs
 - costs incurred due to the law, regulations or other administrative requirements
4. Identify and quantify the present value of benefits that will be recorded as a result of the establishment and operationalisation of a DER Marketplace, again including only those benefits which are additional to the base case
5. Based on estimated costs and benefits, quantify the net economic benefit of a DER Marketplace under agreed scenarios.

Interrelationships between the CBA and other Project EDGE components

Field Trials

This involves implementing 23 technical trials

After the trials have been completed, a report would be developed on actual vs. estimated DOE results

The DOEs and some of the outputs generated by the field trials feed into the DOE techno-economic modelling and the CBA.

Techno-Economic Modelling

This work carried out by Energeia involves designing, simulating and testing a set number of DOEs.

It also involves employing a design field trial of 23 experiments.

The designing of the DOEs feeds into the field trials.

Simulation results from DOEs are feeding into the CBA.

Cost-benefit Analysis

The CBA models a number of scenarios.

These scenarios are discussed in further detail in the following slides.

The CBA results will help to test the economic viability of the EDGE DER Marketplace.

Stakeholder feedback and future rule changes play a key role in the CBA framework

Rule Changes

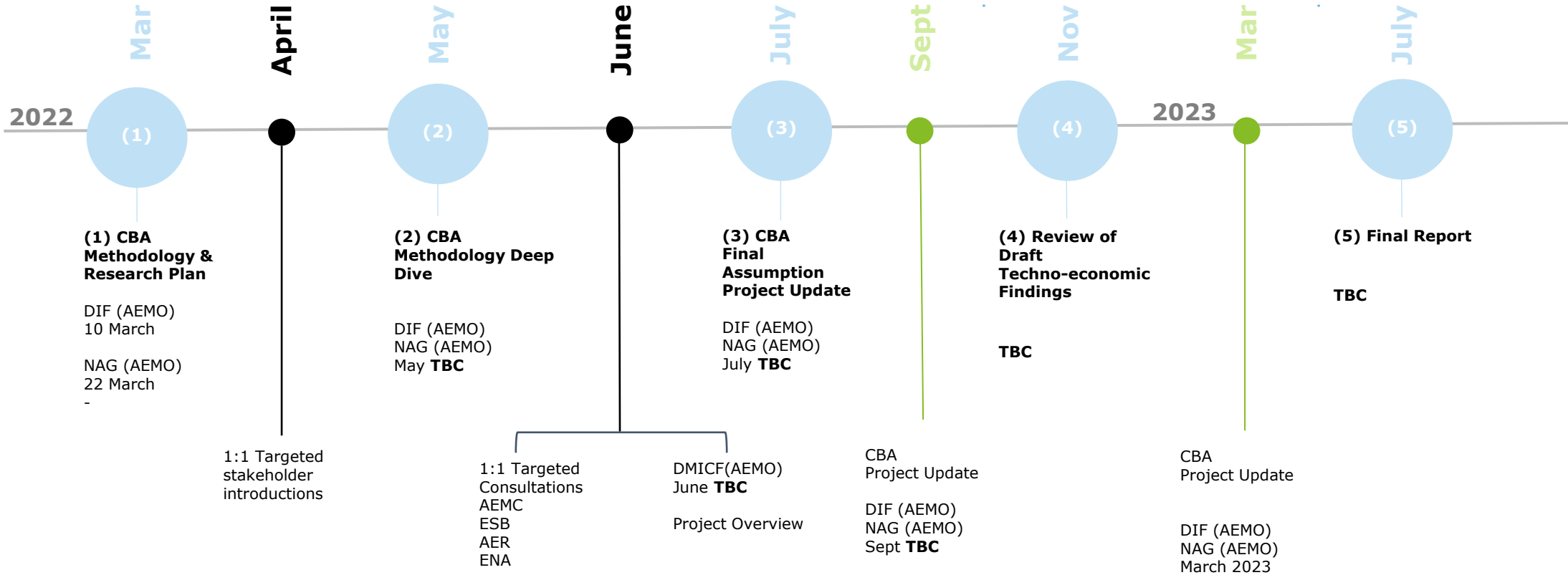
The CBA results would provide inputs and validation for rule changes supporting DER market place implementation capabilities.

These could include:
DER market roles and responsibilities
data exchange architecture
dynamic operating envelope approaches and obligations.

Consultation timeline

Over the course of the project, all project stakeholders will have an opportunity to review and consult on project methodology, research plan, assumptions, and draft findings. Consultations will occur approximately every three months, over four touch points in the CBA development, targeting pre-existing AEMO forums (some noted below, others may be added later based on need). Additionally, highest priority stakeholders will be consulted 1:1, with some later-stage additions as required.

- Group Consultation
- 1:1 Targeted Consults
- Status Report Update

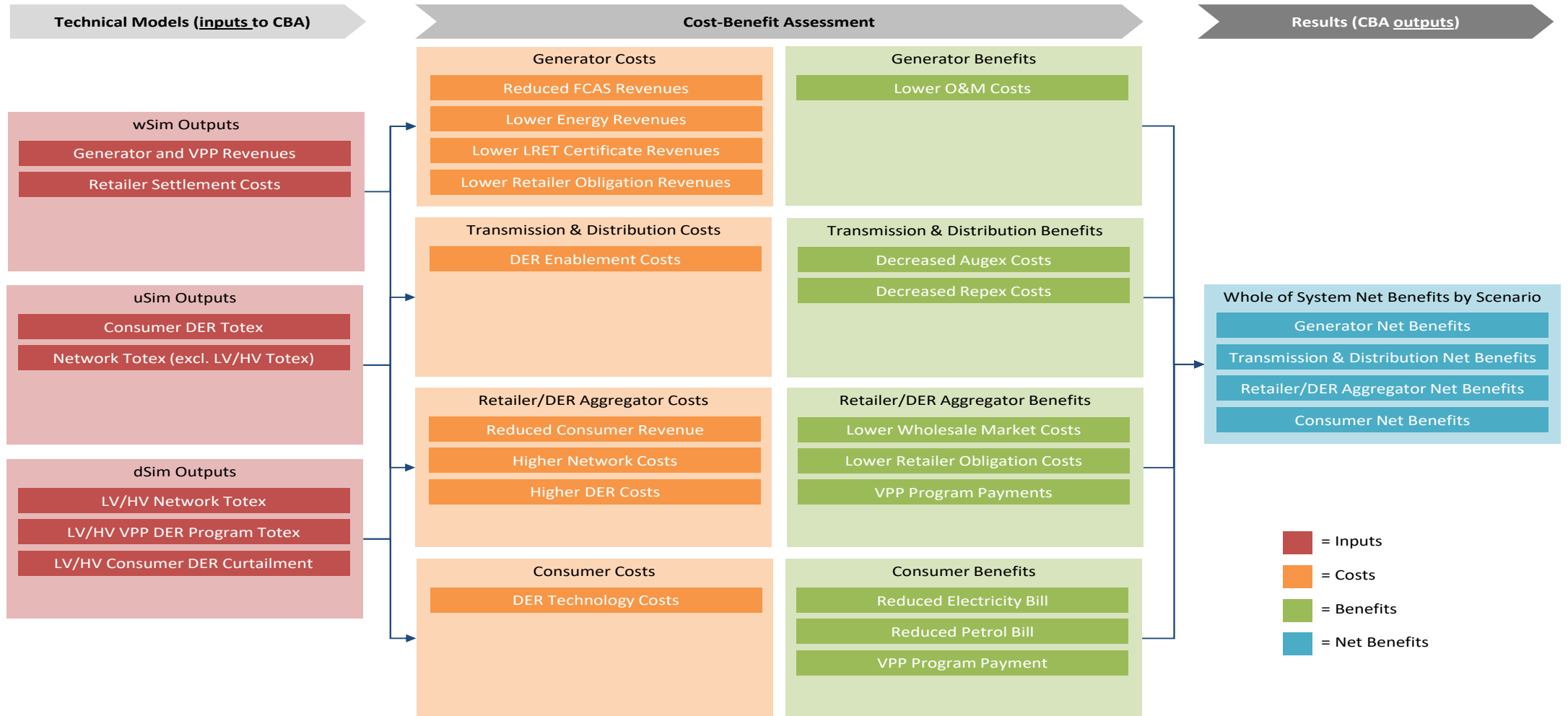


CBA Process Overview

Key CBA elements and their relationship with the Project EDGE Technical Modelling

The CBA will require important electricity market inputs to be developed through technical modelling. These inputs and the CBA variables that they would affect are covered in the figure below.

The CBA Framework and its inputs from the Technical Modelling



The Project EDGE CBA Scenarios

The Project EDGE CBA scenarios are designed to provide a framework for measurement of incremental benefit of the project marketplace in different future external market environments. The first and last scenarios are used to bookend the analysis moving from a rudimentary operating envelope and market design to a sophisticated data hub and local service exchange.

The CBA scenarios are structured in a way that ensure there is variation across at least one out of three key areas:


- the load and DER assumptions
- a set of arrangements around the:
 - constraint optimisation frequency; co-optimisation model; and DOE optimisation methodology and objective function.
- the inclusion and exclusion of a data hub and local service exchange.

Key scenario elements for the 10 different CBA scenarios

Scenario Element	AEMO Step Change Load and DER Assumptions					Renew/ECA Load and DER Assumptions				
	1	2	3	4	5	6	7	8	9	10
Load and DER Assumptions	AEMO Step Change (Draft 2022 ISP)					Renew / ECA				
Solar Uptake										
Battery Uptake	Enegeia will develop equivalent figures					Enegeia will develop equivalent figures				
Electricity Consumption Growth										
EV Uptake	Enegeia will develop equivalent figures					Enegeia will develop equivalent figures				
VPP uptake										
Customer Connection Growth	Enegeia will develop equivalent figures					Enegeia will develop equivalent figures				
Heat Pump Water Heating Uptake										
DOE / Market Arrangements										
Constraint Optimisation Frequency	Daily	Daily	Daily	Intra-day	Intra-day	Daily	Daily	Daily	Intra-day	Intra-day
Co-optimisation Model	VPP Only	VPP Only	VPP Only	100%	100%	VPP Only	VPP Only	VPP Only	100%	100%
DOE Optimisation Methodology	Approximation	Approximation	Approximation	LV Data Driven	LV Data Driven	Approximation	Approximation	Approximation	LV Data Driven	LV Data Driven
DOE Objective Function	Nameplate Pro-rata	Max Service Value	Max Service Value	Max Service Value	Max Service Value	Nameplate Pro-rata	Max Service Value	Max Service Value	Max Service Value	Max Service Value
VPP Standards and Point to Point Integration	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Data Hub	⊗	⊗	☑	⊗	☑	⊗	⊗	☑	⊗	☑
Local Services Exchange	⊗	⊗	☑	⊗	☑	⊗	⊗	☑	⊗	☑

Future rule changes, their expected impacts and CBA incorporation options

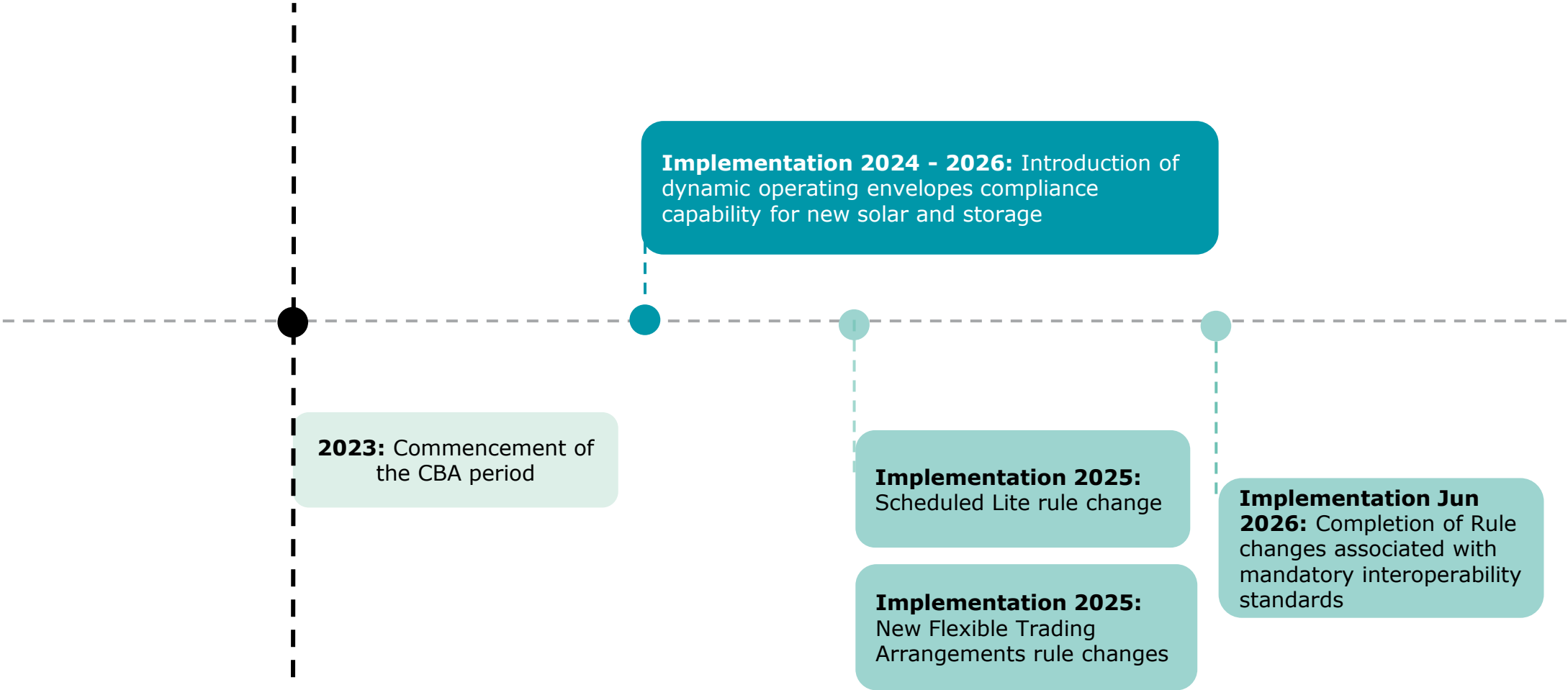
The following areas of planned regulatory change with impact for Project EDGE have been identified through the gap analysis and classified for CBA incorporation.



Rule change	Objective	Implications	Expected impacts	Proposed CBA incorporation
Rule changes requiring new solar/storage installations to be able to comply with DOEs	Requiring new DER to be able to automatically switch off when needed by a DNSP's DOE from late 2023/early 2024	It is already proposed that all DER would need to comply with rudimentary DOEs for all scenarios	Material	Scenarios 1-3 assume capability rather than compliance Scenarios 4-5 assume compliance. Representation in the co-optimisation model
Schedule Lite rule change	VPPs could voluntarily let AEMO know their dispatch plans	Improved AEMO/DNSP visibility of VPP intentions	Moderate	Scenario 2
New Flexible Trading Arrangements rule changes to enable increased DER participation	Allow customers to get their electricity from a retailer and provide DER services through a different VPP provider using the same meter	Key mechanism for increasing DER penetration and VPP competition	Moderate	All Scenarios
Rule changes associated with mandatory interoperability standards	Prevent customer DER assets from being locked-in to one service provider or service	More customer convenience, leading to increased VPP competition	Moderate	All Scenarios
Medium-Term Projected Assessment of System Adequacy (MT PASA) rule change	Enhance pre-dispatch information reporting to AEMO to better understand how to operate the network safely	Improved VPP uptake incentives due to better opportunities for customers to support network operations	Minor	All Scenarios. Impacts expected to be immaterial

Rule change completion and implementation timeframes in relation to the CBA

The defined timeline for expected rule change completion and implementation is illustrated below. Rule changes scheduled for completion prior to the CBA period will be included from commencement.



Contact

Stakeholder consultation for Project EDGE CBA is conducted according to the process outlined on slide 14. For additional information on the project or to submit queries or feedback, additional project sources are noted.

You can find more information on Project EDGE via the [project specific website](#) or get in touch via the email to the right.

Additional to this consultation, you may choose to participate in a relevant [forum](#) for which further consultation.



**How to provide feedback to
Project Edge:**

EDGE@aemo.com.au



Schedule Lite Update

Trent Morrow [AEMO]

Ana Garcia Castro [AEMO]

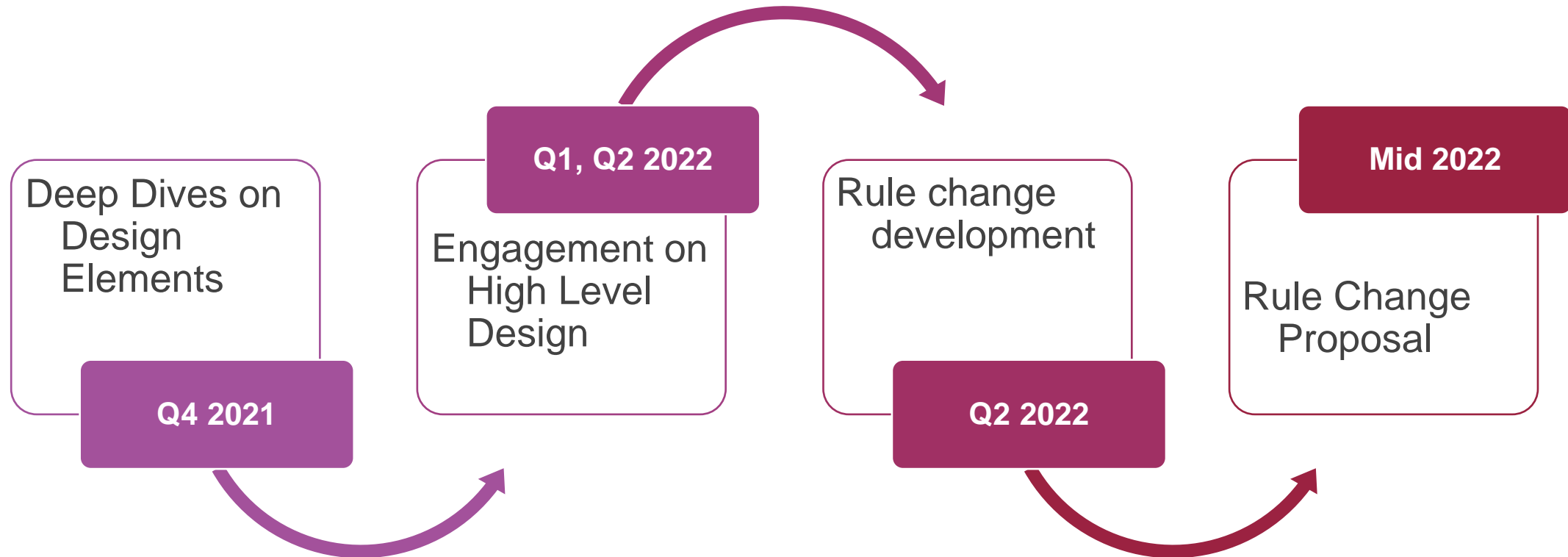
What is Scheduled Lite?

- Voluntary mechanism aimed at lowering barriers and providing incentives for non-scheduled load and generation to provide information and participate in scheduling processes.
- The mechanism will be applicable to loads, aggregated DER and small generators (< 30MW). We expect participation in the market by a trader rather than direct participation of end users.

Development of Scheduled Lite mechanism

- ESB proposed the development of the Scheduled Lite mechanism as part of the DER Implementation Plan.
- The Scheduled Lite mechanism complements the implementation of Flexible Trading Arrangements, aiming to better integrate flexible demand and DER into the NEM.
- AEMO tasked with preparation of a high-level design and submission of rule change request by mid 2022.

Scheduled Life – Timeline and Stakeholder Engagement



Scheduled Lite Models

Two models are being developed for participants to opt into:

1. *Visibility Model* will focus on the provision of real-time and forecast information to AEMO for use in forecasting and market scheduling processes. In particular, participants will be required to provide a forecast of generation and demand at various price points over the short-term operational horizon.

2. *Dispatchability Model* will integrate price responsive load and generation into the NEM dispatch process. Participants will be able to:

- Provide bids for their generation and load
- Receive and follow dispatch targets
- Gain access to existing / potential future markets that require the scheduling of resources

DER MICF Feedback

Workshop 30 March 2022

Visibility Model

Design Element

Feedback

AEMO response/ Action

Participation

- Please clarify the **value** of having a **secondary connection point** and the **separation of price responsive resources** for the visibility model

- Participants will **not be required** to establish a **secondary connection point** to participate in the visibility model unless they **choose** to do so (via FTAM1* or FTM2**).
- AEMO is **considering a range of models** to enable broad participation in the visibility model and will continue to seek feedback from stakeholders on potential options as the model develops.
- AEMO expects that the **value in the separating controllable resources** from passive resources is the ability for the participant to more **accurately forecast** those controllable resources***
- If a participant **is able to forecast** its consumption and generation at a **single connection point** (i.e. controllable and passive resources) within a performance tolerance band then this **type of participation should be facilitated**.

- "How does this model deal with the fact that flex assets may not be accessible all of the time, and could switch between non-flex and flex depending on customer preferences?"

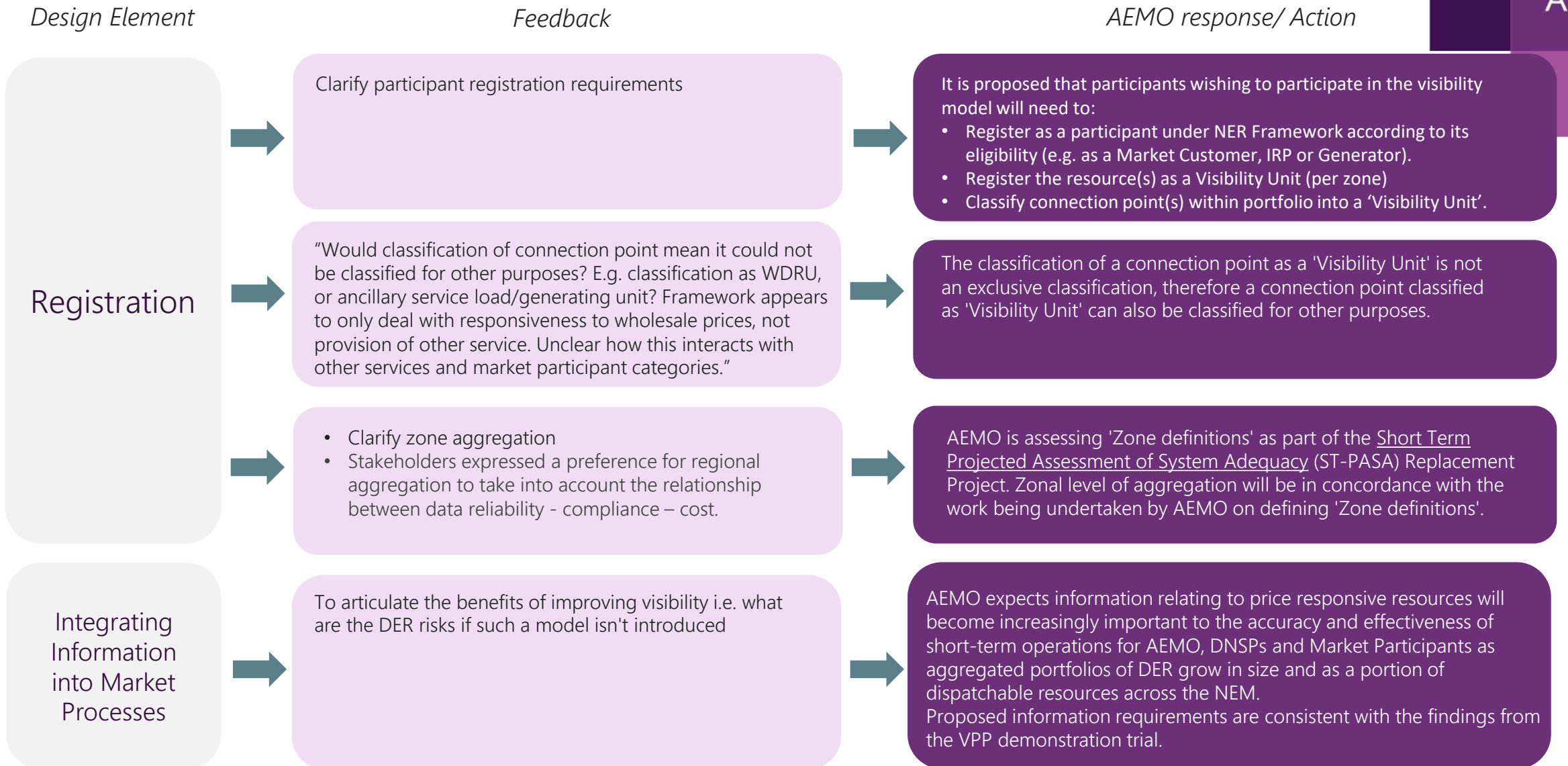
- The proposed design enables two alternatives, for this case/situation they are:
- On a **bottom up basis** - the participant can reflect the change in the **forecast information** they provide through their indicative bids as appropriate.
 - At a **portfolio level** - the proposed operating model would provide the participant with the option to **opt-in (active)** or **opt-out (passive)**, which the participant can utilise as appropriate.

- "Parent/child type arrangements may throw up some commercial challenges with regard to impacts on network charges. Particularly as we see trials of new network tariff structures aimed at price responsive and exporting resources."

Allocation of network charges is a key consideration for the Flexible Trading Arrangements (FTA) rule change proposal. AEMO has noted a range of options in its high-level design for the AEMC's consideration.

* Flexible Trader Model 1 is being implemented as part of the IESS rule change
 ** Flexible Trader Model 2 subject to rule change approval
 *** In the case of the dispatch model – to better conform to dispatch instructions

Visibility Model



Visibility Model

Design Element

Incentives
and
Compliance



Feedback

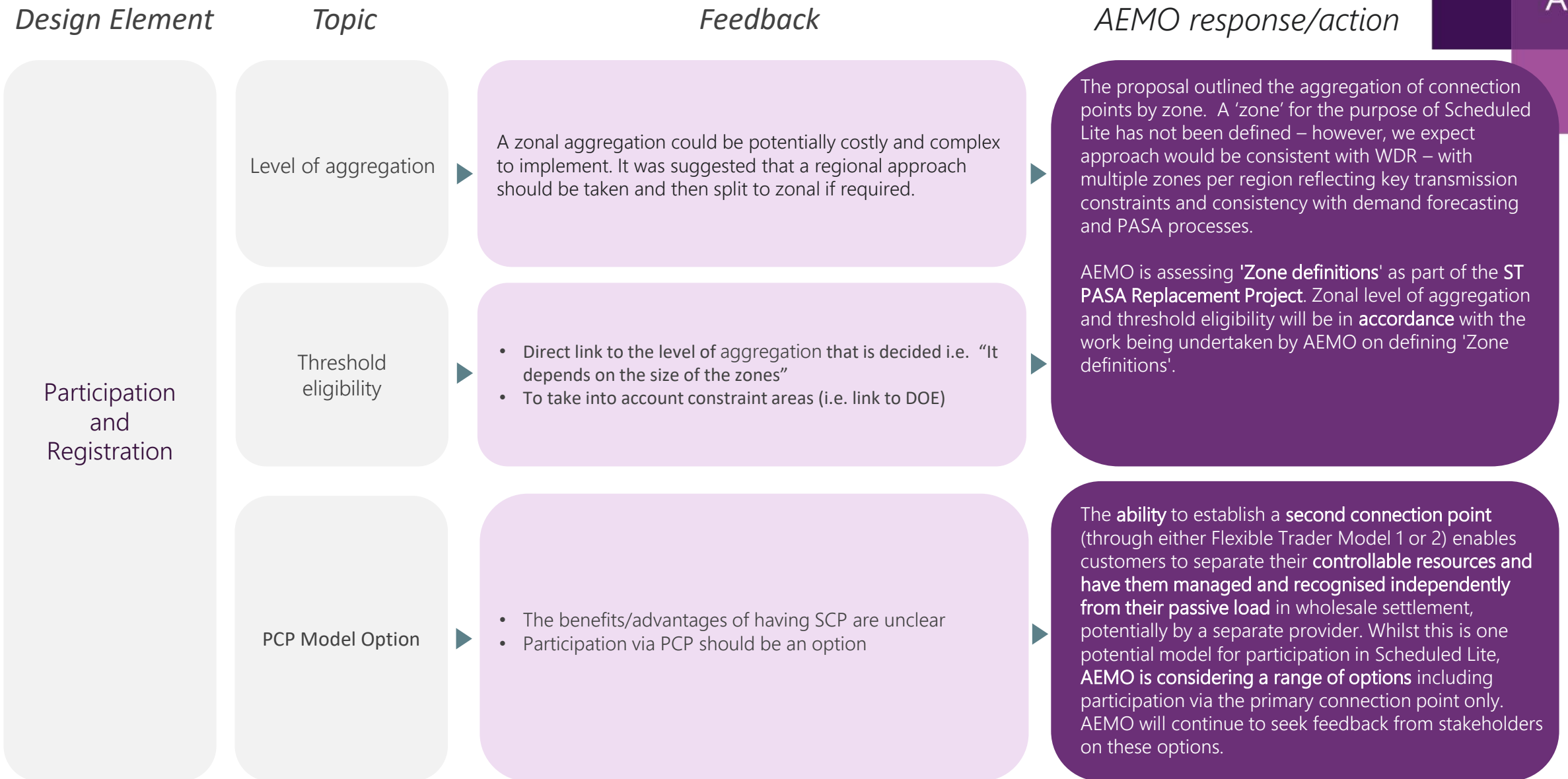
- There will be a cost to the customer and the DER trader associated with participation in the visibility model.
- The potential incentives may not be sufficient to warrant participation, and it may be complex to communicate the benefits and participation requirements to customers.



AEMO response/ Action

AEMO notes these comments and agrees that the success of the mechanism will be dependent on establishing incentives and value to consumers, and balancing these against the costs. Further consideration and engagement with stakeholders will be carried out as the design is developed.

Dispatchability Model



Dispatchability Model

Design Element

Topic

Feedback

AEMO response/action

Data Exchange

“Project EDGE CBA is considering Data hub costs, will that analysis feed into this process?”

Project EDGE will continue to inform Scheduled Lite Design.

Dispatch

Bid Granularity

- Direct link to the level of aggregation
- Benefits may not stack up at a small scale
- To consider NEMDE capabilities on managing large number of DUIDS and the associated cost of doing so
- To consider consistency

AEMO notes these comments to reinforce the ongoing work in defining zones, in order to ensure consistency between the different elements of the dispatchability model; i.e. the level of aggregation and threshold eligibility. (See answer Dispatchability Model> Participation and Registration>level of aggregation)

System Limits

No specific comments

Continue current approach

Incentives and Compliance

- Participation in future markets is not an immediate incentive
- Enable provision on the Reg FCAS markets is a key incentive
- Clarify potential avoidance of RERT cost
- To take into account that benefits accrue at SCP

AEMO takes note of these comments as part of ongoing work to assess/identify/apply potential incentives to participants wishing to take part in the dispatchability model.

To clarify who is going to undertake compliance

AEMO expects that compliance with dispatch instructions will be monitored by the AER. However, further consideration of appropriate compliance arrangements is required – for instance, a participant may be compliant if it meets a certain performance threshold specific to Scheduled Lite Dispatch units.

Opt-in Model and Other consideration

Design Element

Feedback

AEMO response/ Action

Operating Model - Opt-in Arrangement

- As a voluntary scheme, opt-in/out-out is essential
- To consider switching between visibility model and dispatchability model
- To consider the opt-in arrangement as an approach to addressing portfolio scale issues

AEMO notes these comments and will further assess the Opt-in arrangement.

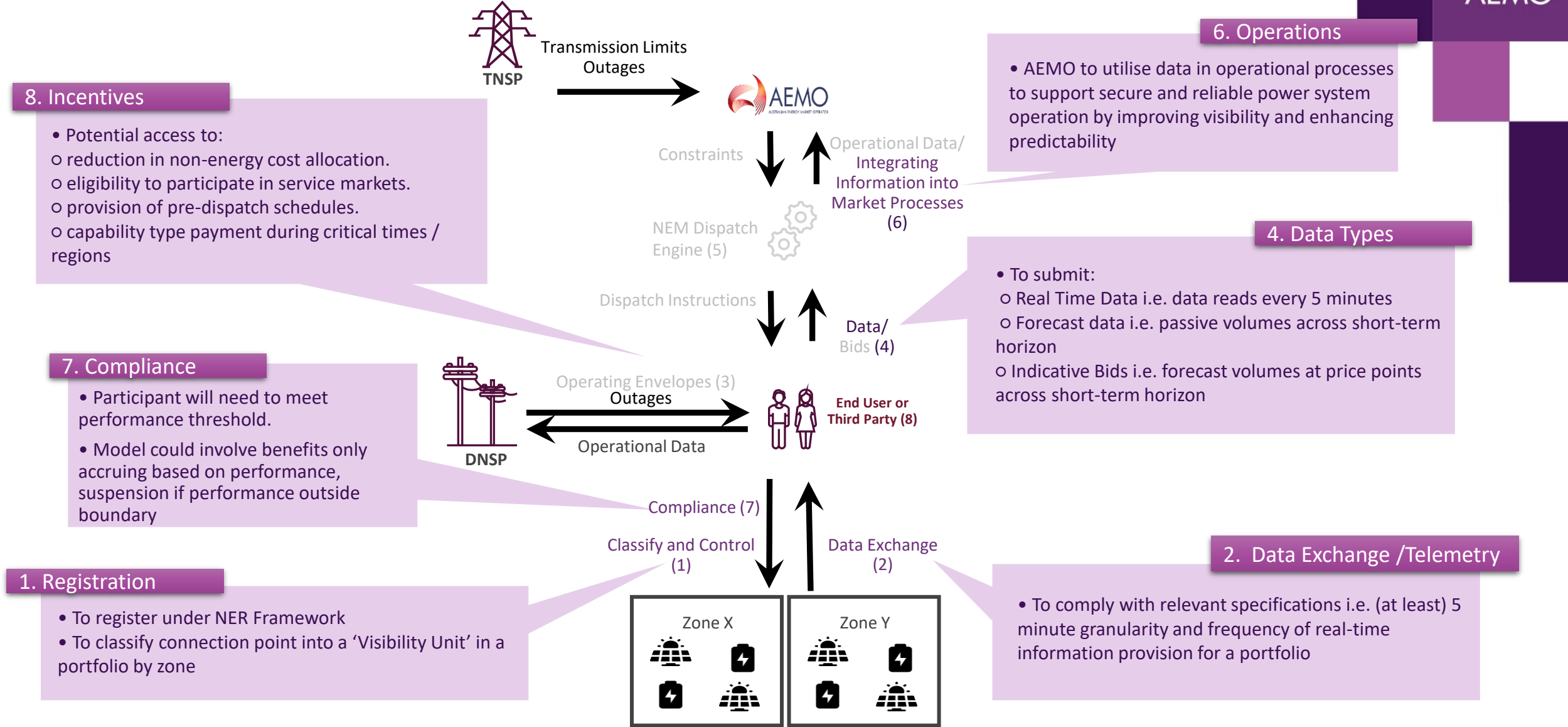
Other considerations

"The IEC Systems Committee on Smart Energy currently has two pieces of work to look at Market Architecture including VPPs and bidding of DER. Both are rather new"

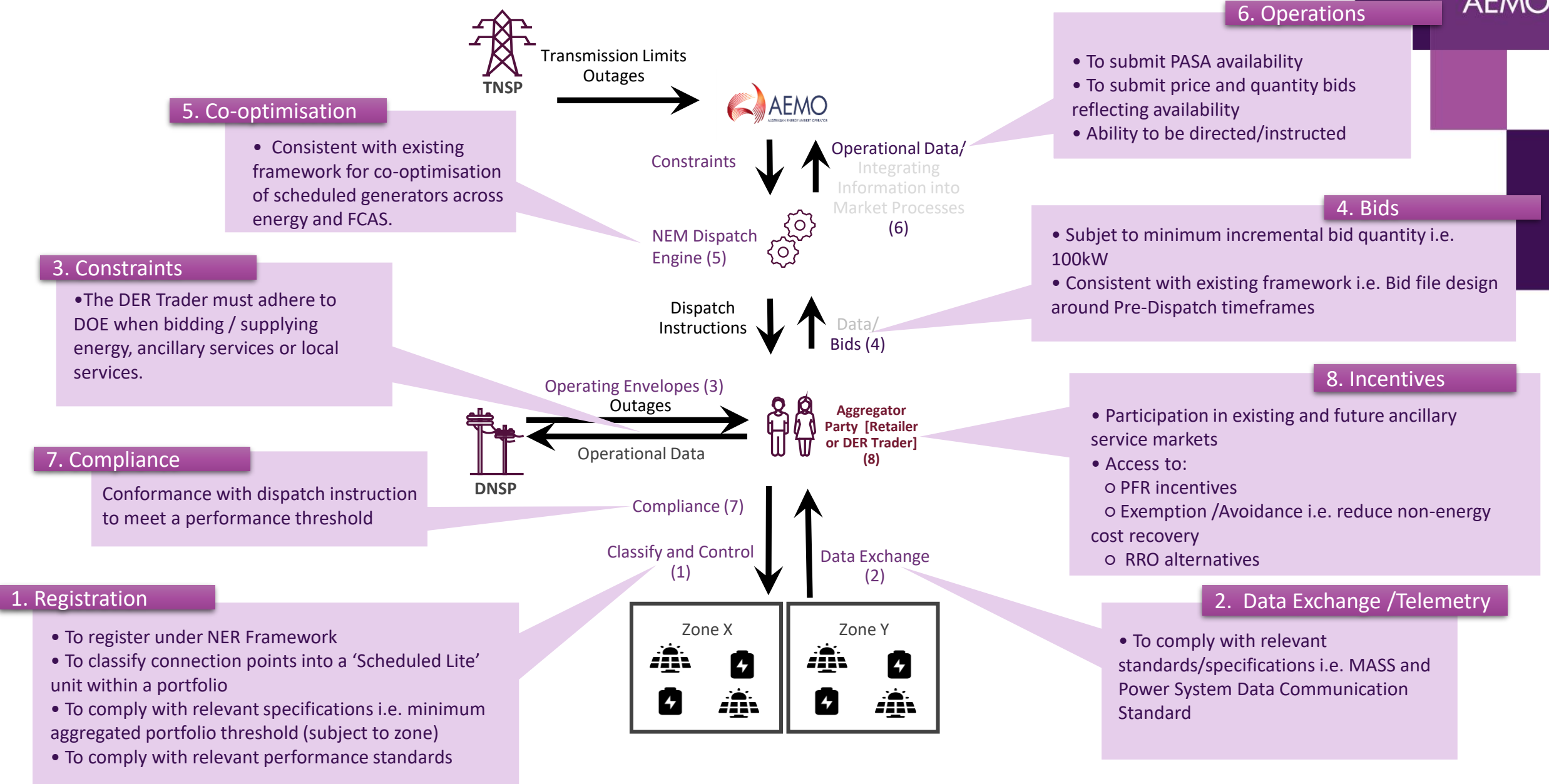
AEMO notes this comment and will review the IEC work to guide future development of the Scheduled Lite models

Straw Designs for Scheduled Lite

Visibility Model Straw Design



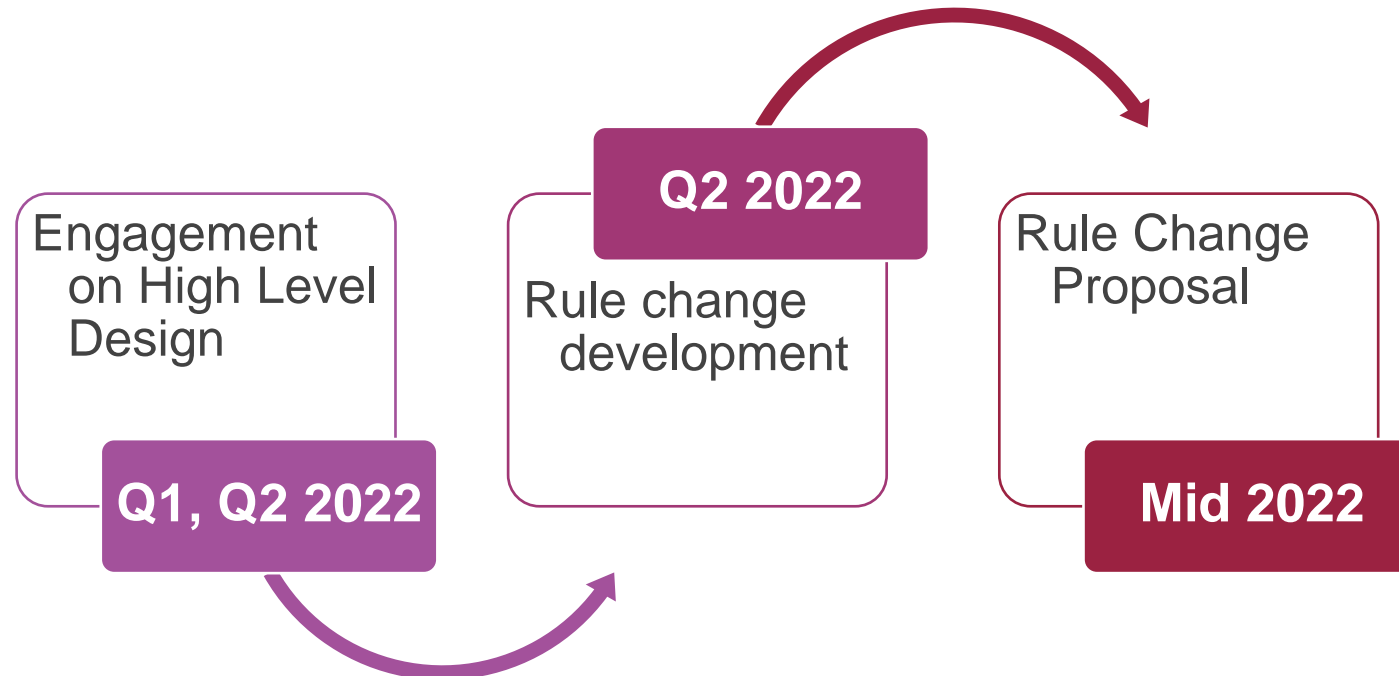
Dispatchability Model Straw Design



Next Steps

Indicative dates:

- Incorporate feedback into High Level Design (HLD) development
- Scheduled Lite HLD to be issued for consultation in Q2 2022.
- AEMO to submit rule change request in mid 2022



Q&A

Raise a hand to speak
Use the Teams chat function



Any other business





**Next meeting: 26
May 2022**

Future Meetings & Close

Questions & contact

DERProgram@aemo.com.au



For more information visit

aemo.com.au